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ABSTRACT

Written from experiences at the May 1987 Writing across the Curriculum Summer Writing Institute at Indian Hills Community College in Ottumwa, Iowa, this collection of 14 essays describes methods of using writing as a learning tool across various disciplines. The 15 instructors attending the workshop represented the fields of technical communications, history, science, English, art, electronics, mathematics, computer maintenance, lasers, robotics, data processing, and drafting. The workshop was designed to examine current theory and research in writing instruction, methods of using writing in all subject areas, methods of fostering cooperation and cohesion in writing instruction among instructors of different subject areas, and the personal writing development of each instructor through peer writing group experiences. Essays from the workshop include: (1) "The Use of Philosophical Writing in History Courses"; (2) "A General Physics Laboratory Report on the Hydrogen Emission Lines and Bohr's Theory"; (3) "Journalizing Mathematics Assignments"; (4) "Teaching Language Effectiveness"; (5) "The Journal for Painting"; (6) "Writing and Computer Aided Drafting"; (7) "Using Writing in a Computer Course"; (8) "Workaday Writing in Mathematics"; (9) "Integrating Writing Skills throughout a High Technology Vocational Curriculum"; and (10) "Use of Student Notebook in Biology." (MM)

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Essays Grown from a Writing Across the Curriculum Institute at Indian Hills Community College: Fostering Cooperation and Cohesion in Writing Instruction, Edited by Dr. Jeffrey S. Copeland, Assistant Professor of English Education, University of Northern Iowa, Cedar Falls, Iowa.

ABSTRACT

This document contains a description of the Writing Across the Curriculum Summer Writing Institute held in May of 1987 at Indian Hills Community College in Ottumwa, Iowa. Also included are fourteen essays written by participants in the institute. The essays, grown from experiences in the institute, describe methods of using writing as a learning tool across the disciplines.

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INTRODUCTION

In May of 1987, fifteen teachers representing twelve academic subject areas at Indian Hills Community College in Ottumwa, Iowa met to take part in a Writing Across the Curriculum Summer Writing Institute. The workshop was designed to examine the following areas: 1) Current theory and research in writing instruction, 2) Methods of using writing as a learning tool in all subject areas, 3) Methods of fostering cooperation and cohesion in writing instruction among instructors of vastly different subject areas, 4) And, allowing the instructors to explore and develop their own writings through the use of peer writing group experiences.

Instructors attending the workshop represented the fields of Technical Communications, History, Science, English, Art, Electronics, Mathematics, Computer Maintenance, Lazers, Robotics, Data Processing, and Drafting. Initial discussions in the workshop indicated all participants were present because they felt writing was both an important and necessary component of the learning achieved by the students in their classes. It was also apparent many chose to attend the workshop to have some of the writing theory/practice "demistified." To help the instructors explore these areas, the daily workshop sessions were comprised of four related elements: 1) Reports from participants showing how and why writing is used in their classes, 2) A presentation examining one aspect of writing theory/research, 3) Discussions of practical methods of writing as a learning tool in all subject areas, 4) Allowing the participants to write (about a variety of related subjects) and share this writing in peer writing groups.

In the daily workshop sessions, the participant reports ranged from using writing to help students clarify thinking when these students are asked to design a functioning robot to using writing to explore and analyze causes of computer programming errors. The daily presentations relating to writing theory/research ranged from discourse theory to management of student writing/peer groups. "Practical" classroom applications discussed ranged from use of laboratory notebooks to using guided freewritings at the end of lectures to help students organize the thoughts of the day.

At the conclusion of the institute, participants were encouraged to write a description of a successful method of using writing as a learning tool in their classes or write a general piece focusing on a topic related to using writing in all subject areas. These pieces represent the many years of experience of the instructors, and the writings are presented here to allow other instructors a place to examine useful ideas, re-think current methods of using writing, and possibly discover new methods to use in their own classes.

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Essay #1. "The Use of Philosophical Writing in History Courses," by Siegfried H. Sutterlin.

History does not exist apart from writing. In teaching history, writing is viewed too frequently as a tool or means of transmitting something which exists independent of the written word. In this framework, the historian acts merely as one who describes and interprets a body of knowledge that is a research arena approachable from the outside by all historians. Writing, then, is only the means by which historians as social scientists communicate within the academic community. It is a means to an end.

However, to separate means from end, form from function, process from program is to divorce the teaching of history from that tradition of Western

Civilization which views man as a creative individual who is endlessly evolving new ways of understanding himself and the world in which he lives. In this humanistic tradition, the writing of history is an artistic enterprise in which the form of the writing itself is a meaningful part of the ordering of facts and interpretations. It, too, forms the essence of an historial work. Lectures and seminars are obviously also suitable arenas in which to practice the historial art. But, both are limited to the context of a particular audience on a particular day and are part of the continuing historical creating process in the academic community only to the extent to which a written record is available to other historians.

To use writing in history courses is, in effect, to teach each student to become his own historian. It implies a respect by the teacher for the creative abilities of each individual. To accept from the student work which does not reflect his own talents, work which is only a cataloguing or summary of the work of others is to ignore his potential as a creative individual. It permits the development of bad habits. In effect, it mistreats him and denies him a major element of becoming educated. For this reason, writing assignments in history courses must encourage each student to develop an independent historical perspective which he can express through the written art form.

As with any art form the student learns in part through apprenticeship--through practicing the craft and having it evaluated by a master. For this reason, the student must be exposed to good historical writing in order to have a model on which to form his own works of art. A good history instructor will constantly point out the good points and bad points of assigned readings. He will indicate faulty reasoning, inadequate support for interpretations, ineffective style and personal bias found in textbooks. Thereby, he will make the student more aware of the historian's craft. The lectures, in

themselves, should present the class with examples of history-creating as works of art. A student can hardly be expected to become excited about creating history if his only exposure to history is the dull repetition of dates and names devoid of any key concepts, themes, possible interpretations, or threads of causality. Therefore, good lectures, in effect, lay the framework for good writing in history courses.

Writing assignments which this writer has found to be the most effective ones in history courses have been philosophical papers on historical themes applied to the content of the course. The papers were to be entirely the student's own work. They could not be research papers involving library research; they could not be interviews with prominent people; they could not make use of letters of veterans and/or grandparents or oral history or any other externality. They would have to be generated by the student's own ideas about historical events covered in the course. Since history is not a theory nor a system, a list of at least several dozen key concepts and themes common to history were given to each student at the start of the course. They provide examples of ideas with which to begin a philosophical examination of the course content. Students were encouraged to develop additional themes and concepts as the course evolved. The following list contains a sample of key themes and concepts:

1. The concreteness of irony in history.
2. Full understanding occurs after an historical event.
3. Teaching history involves demythologizing.
4. The insignificant beginning of major historical events.
5. The function and uses of language in history.
6. Politicans do not retreat until confronted by an overwhelming event.
7. History as a constant process of solving problems, frequently, the solution in itself causes future problems.
8. The notion of progress in history.
9. The increasing bureaucratization and programmization.
10. The coordination of knowledge in economic history.

This assignment closed all paths of least resistance. No external

crutches could be enlisted in writing the papers. They had to be exclusively the products of the student's thoughts and efforts. To be sure, the students could use the key concepts and themes listed and heavily exemplified during lectures. But, if he did so, he would demonstrate having made the transition of knowing the key concepts to understanding them.

At first, the students were dismayed and puzzled. In fact, they appeared rebellious and posed questions like "how can we write a paper if we can't do research in the library;" "I want to write on the Second World War and interview some veterans;" "my ancestors left a lot of letters that I'd like to use." A philosophical paper seemed indeed alien and novel to the students. In fact, it was threateneing insofar as it clashed with the habit of enlisting external aids in writing term papers. After patiently explaining the nature and possibility of a philosophical paper, the grumbling diminished and work began. The resulting papers have been the best this writer has ever read. In fact, they fulfilled to the greatest extent the following criteria used to evaluate superior papers meriting an unqualified "A". A paper in this category:

1. Has a direct relationship to what the topic calls for and does not exceed the framework and limits of the topic.
2. Uses the student's own language uniformly and continuously.
3. Possesses sound reasoning with few informal fallacies and progresses in logical steps so that an overall coherence is achieved.
4. Has excellent mechanics. Errors in spelling, grammar, punctuation, etc. are nearly absent. Conceptual errors are few and minor.
5. Harmonizes good word choices to enhance clarity, description, and analysis.
6. Shows a sense of history which reveals a philosophical maturing process in many subtle ways. Does it transcend the "ego" or "me" orientation, or the "overpsychologized" or "self-centeredness" of "modern consumerism?"
7. Progresses toward independent-mindedness which fulfills a major criteria of becoming educated.
8. Avoids succumbing completely to temporary fads and

does not confuse the vigorous support of such fads with profound intellectual achievement. Instead, it strikes a balance between that which is best in traditional writing-though it may still be in need of pruning-with that which is new and emerging to achieve a synthesis in the ongoing process of historical evolution.

9. Is concise and devoid of redundancy while simultaneously exemplifying observations by referring to specific historical events.
10. Avoids excessive personalizing to attain a detached academic, and analytical perspective so that it locks into those truths, habits, and observations that are enduring and that will periodically be rediscovered. The satisfaction and awareness achieved through this becomes for the student the primary reward for having written the paper. This reward may exceed the reward and satisfaction residing in an excellent grade.

The use of writing in history courses as exemplified by this assignment makes the act of producing the written word a part of the thinking process by helping the student realize that the expression of an idea is part of that idea. It also enriches both the student and the instructor by making them partners in history creation rather than authority and recipient. Each confers on the other the dignity inherent to each in a humanistic tradition that values the individual. Instead of patching together the external aids in a process which often acquires conspiratorial overtones, the student submitted his own product. The teacher, for his part, was assured of no plagiarism. He could honestly assess and give recognition to the student's own intellectual processes.

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Essay #2. "A General Physics Laboratory Report on the Hydrogen Emission Lines and Bohr's Theory," by Earl McMurry.

It would be difficult to exaggerate the importance of the work done by Niels Bohr during the early decades of this century. The classical physics of Newton & Maxwell which worked so well for macroscopic objects was found wanting when affairs of the atom were considered. For example, the light

emitted by excited hydrogen atoms had been thoroughly studied by Bohr's time. The wave lengths of all the hydrogen emission lines in the ultra violet, visible, & infra-red parts of the spectrum were well known. However, no one could explain why these particular values were produced. Bohr succeeded in doing this. He modified the laws of classical physics by introducing a totally new restriction, the quantization of angular momentum. By so doing he not only explained the spectral wave lengths measured, but, more importantly, indicated the direction new theory should go. Quantum Physics was born.

Although revolutionary in nature, Bohr's ideas are simple in principle and so important that all general physics students should understand them. To this end, I ask my students to produce a major piece of writing - much longer than the laboratory reports they usually write. In this they are asked to give an in-depth explanation of what Bohr did concentrating on the totally new elements in his exposition. They recreate Bohr's mathematical theory of the hydrogen atom and show explicitly how it is used to calculate the wavelengths of the hydrogen emission lines. Finally in this section of their report they use Bohr's theory to predict the wave lengths of the hydrogen spectral lines in the visible spectrum.

The next part of their report concerns work they do in the laboratory to check their predictions. That is they measure the wavelengths of the visible hydrogen emission lines. Their account of this work emulates the report written by a professional scientist. The audience is assumed to be knowledgeable but unaware of the specific experiment done. After reading the report he/she should know exactly what was done in the experiment and how, what data was obtained, how it was analyzed, what sources of error were present, and what conclusions the data support.

Finally the students discuss whether Bohr's theory is consistent with their experiment or not.

By doing this writing, it is hoped that the students will benefit in the following ways:

(A) They will understand the nature of physical theory: that it does not represent absolute knowledge. It is constantly subject to change in response to new experiments and each change enlarges the scope of the phenomena explained by the theory.

(B) They will see how the "scientific method" works. Explanations of new phenomena are subjected to the rigors of experimental test and only become generally accepted after survival of many such tests done by different laboratories.

(C) They will obtain an in-depth appreciation of the circumstances that attended the birth of quantum physics. This will help make their transition from the more intuitive classical physics to the more abstract quantum physics easier.

(D) They will see that the concept of beauty applies to the world of scientific ideas as well as to art or music.

(E) They will see the important role that mathematics plays in developing physical theory and in succinctly representing the essence of phyiscal theory.

(F) The report will help develop their writing skills so that complex ideas and procedures can be expressed in a prose that can be clearly understood. Such skills will likely be required of them in their future jobs.

(G) They will appreciate how advancement in science depends critically on the creative efforts of many individuals combined with the special insights provided by a few gifted minds.

As an aid in writing their report, the students are given an outline which details the topics to be covered and the order in which they are to be presented. I go over this outline in detail and give examples of what might be found in each section. This insures that all reports will include the items

I feel are important. The students are told that their report must be detailed enough so that it could be understood by someone who knows general physics but had no special knowledge about the experiment done by them.

I use a holistic method in grading these reports. All reports are first read without making comments. Each report is then re-read, mistakes are corrected in red, and suggestions for improvement are given. Using these remarks as a guide, the reports are arranged in order from best to worst. Each paper is given a numerical grade which reflects how good I think it is and its position in the pile. There is a subjective element in this method of grading which I do not like. In the future I plan to grade each section of a report separately so that the overall grade is the composite of many parts.

Although a few of the reports I receive are disappointing, most represent a sincere effort on the part of the student to master the project. In fact, these reports may well be the single most valuable learning experience they will have in the course.

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Essay #3. "Journalizing Mathematics Assignments," by Janet Swaby.

The community college, as an open enrollment institution, has the responsibility for providing whatever remedial education is necessary to enable students to progress to the point where they can succeed in college-level classes. The necessity for remediation has been especially apparent in the area of mathematics here in the state of Iowa, since the state only requires one year of mathematics for high school graduation. The number of students who come to college with minimal, if any, experience with algebra has led the state universities to institute tougher mathematics entrance requirements. There are also a large number of non-traditional students --

displaced homemakers, laid-off factory workers, and farmers who must look for a new occupation -- who have forgotten any algebra they knew twenty years earlier. These people are turning to the community colleges in increasing numbers for mathematics remediation.

At Indian Hills Community College, algebra remediation is provided in a class called Basic Algebra. The class is generally evenly split between students who had algebra at least a decade earlier but need a memory refresher, and those whose earlier experiences with matematics had been so negative that they avoided the subject in high school and were walking into this class with a feeling of dread. It becomes as important for the instructor of this class to instill mathematical confidence as it is to teach algebraic competence.

When I first heard of the concept of writing across the disciplines, I did not want to incorporate writing into the class simply for the sake of following a trend. I had no intention of putting myself into the position of trying to use mathematics to teach writing, but wanted to use writing to enhance the understanding of algebra. However, it occurred to me that integrating a small amount of writing into the homework for these students might yield big dividends in terms of learning and confidence.

A certain amount of writing is inherent in any mathematics class. A student does not learn to do algebra by watching the instructor work problems and sketch out proofs; the real learning takes place later when that student works problems on his own. There is an old Chinese proverb that says, "I hear and I forget; I see and I remember; I do and I understand." This is never more true than in mathematics instruction. The assignments for Basic Algebra are typical of any algebra class: very generous doses of introductory algebra problems -- manipulation of expression, solving equations, and applications of those equations. I wondered whether the value of those assignments might be increased by expanding the assignments into a journal of algebraic

understanding.

I decided to experiment with a summer class. The class was not really typical, for it met at 7:00 A.M. and was composed of primarily non-traditional students. These two factors generally lead to a more highly motivated group than average. For this reason, I can make no statistically sound conclusions, but merely offer observations.

On the first day of class, I explained class procedures. I encouraged them to do their homework in a separate notebook from their class notes. They were to keep a pen in a different color handy as they worked their homework, and, when they had a question or made a discovery, they were to jot that note next to the problem. I explained that a brainstorm will often occur while working homework that will help later when studying for a test, but, unless one writes down that idea, it is soon forgotten. We also agreed that it would help them remember their questions when class convened the next day. I told them that I would look at their assignments, but would not grade them. The main reason for letting them know that I planned to look at them was to encourage them to actually go through this process. As the course progressed, I glanced through the notebooks whenever the students were taking a test or quiz.

The type of comments varied tremendously, but they generally showed the thought processes that the students were experiencing. Many times they wrote the questions they wanted to ask me. "Does it make any difference which form the answer is in?" "I was able to do this problem because it matched an example, but I don't understand how to arrive at the original equation." "I'm not sure when I'm done factoring." "I need a run-through on factoring by grouping." "Is there more than one way to do this problem?"

At other times, the student wrote notes to himself. "Finally got it!!!" "Look these over before the test -- real hard." "I'm stuck! I can't even work

it backwards!" "Be careful not to make sign errors." Occasionally the student had written a question, then crossed it out with the notation, "Figure it out!" It seemed to me that requiring the student to write out that which he did not understand encouraged him to think through the problem more carefully.

I had expected this process to lead to a more efficient use of that portion of class time devoted to answering questions. Our question time was certainly efficient, but many more questions were asked than had been formerly since the students were so easily able to isolate those ideas which had given them trouble. The quality of the questions seemed much higher than I had seen in previous classes, showing that the students had put more thought into their homework.

The test results for this group were outstanding, but, as I said before, I do not know how much of this excellence can be attributed to incorporating writing into their assignments. The class averaged 90.7 per cent on their tests and quizzes, compared with an average of 75 per cent for my three other Basic Algebra classes over the past year. The attrition rate was also lower: fourteen per cent of my summer students dropped the class, compared with an average of twenty-two per cent of the students in the other classes over the past year. The level of understanding exhibited in their questions in class and their comments on this process of journalizing their algebra assignments has convinced me of the value of this process. One student summed up the feelings of those in the class by saying, "Even if I don't ask you about the idea I wrote down, there's something about writing my thoughts down that helps me remember these concepts later." After my experience with incorporating writing into this algebra class this summer, I intend to continue the process in the rest of my mathematics classes in the future.

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Essay #4. "Teaching Language Effectiveness," by David M. Kirchner.

English instructors often receive a broad range of teaching assignments. Traditional composition and literature classes are not difficult or unfair assignments, but that same broad range of English and language art classes can also include: creative writing, journalism and mass media, drama or theatre arts, and, of course, speech. This is an imposing, if not intimidating, list, and most English instructors find themselves inadequately prepared to teach in so many subject areas.

There is a partial solution. It will not altogether eliminate or relieve the burden of heavy, multi-prep teaching assignments, but it can simplify some of the preparation process. English instructors should view all writing assignments and projects as having a similar heritage and sharing comparable components. In doing this, they can unify their teaching objectives into a cohesive approach in the classroom, regardless of the class.

English teachers have long held stock in the notion that the imaginative creative process for all writers is much the same. A poet, a dramatist, a journalist, a novelist, a speaker, even a freshman composition student all suffer the same agonies when they begin a writing: brainstorming, creating a thesis, establishing proof, and reaching a logical conclusion. Since writing is central and supportive of most assignments or projects in English and language art classes, the preparation need not be totally different or unique in different classes. American Literature, as a subject, may have little in common with mass media, but writing assignments in both classes could quite easily be handled in a similar fashion.

Speech is a strong example of such a concept. For years, English instructors have found themselves teaching a speech fundamentals class to terrified and uninterested students. Typically, a good deal of time is spent covering outline organization. For those teachers, integrating basic writing

processes in speech outline organization can be highly effective and efficient method of fostering better writing and speaking. In most speech texts today, the chapters on outline organization compare favorably with similar chapters in writing texts. Why teach it any differently. Indeed, if the creative process in speech outlining and prewriting are the same; then we should teach that process as a unified concept. Using such a position, can greatly simplify and streamline teacher preparations.

A good example of this is the Introduction/Conclusion components of the speech outline. Using "language effectiveness" as the ultimate goal of the assignment, several major objectives, present in composition and speech requirements, can be met. Imaginative and powerful introductions and conclusions are desirable in both speech and composition. Using language effectively is the key to student success in these assignments.

The following sample unit covers specific teaching objectives in "language effectiveness" used in the Introduction/Conclusions aspects of speech outlining. This unit could be used, with little or no revision, for writing assignments in practically any English or language arts classes. Regardless of what the specific assignment objective is, the student could be taught to employ common composing techniques and elements of style.

SPEECH OUTLINE

INTRODUCTON - Write out the introduction, word for word in concrete detail. The thesis appears here - supported by sound, imaginative ideas and appropriate and accurate use of vivid language.

BODY OF SPEECH - Speaker's Outline -- Main Points

I. Main Point #1

A.

B.

II. Main Point #2

A.

B.

C.

III. Main Point #3

A.

B.

CONCLUSION - Write out the conclusion, word for word, in concrete detail. Reinforce the thesis with a strong "tie-back" to the introduction. Appropriate language leaves audience with a strong sense of commitment to the speaker's ideas.

THE INTRODUCTION

PRIMARY OBJECTIVES

GET ATTENTION AND INTEREST

Relate the Topic to the Audience (*see example)

State the Importance of Your Topic

Startle the Audience

Arouse the Curiousity of the Audience

Question the Audience

Begin with a Quotation

Tell a Story

REVEAL THE TOPIC

ESTABLISH CREDIBILITY AND GOODWILL

PREVIEW THE BODY OF THE SPEECH

*Relate the Topic to the Audience - Notice the difference in the following sample introduction selection. The first is flat, predictable, ordinary. The second uses concrete detail and more vivid language.

"Today I am going to talk about small claims court--a branch of the local court where ordinary people can press lawsuits involving up to $1,000 without lawyers. I would like to explain how the small claims court works and how someone can go about using it."

"It's two weeks after you have moved into a new apartment. A letter arrives from your old landlord. Expecting to get back your $250 security deposit, you joyfully tear open the envelope. Inside is a form letter explaining why your security deposit is not being returned. What can you do about it? Nothing, right? Wrong! You can file a claim in small claims court."

USING LANGUAGE EFFECTIVELY

Good speakers have respect for language and how it works. How well do you use language? Do you say Goerge Brett plays baseball good, when you mean he plays well? Do you say with the possible exception of, when except will do? Do you describe a mansion as a really big huge house, as if there were such a thing as a small huge house? Do you litter your speech with meaningless words such as you know, like, I mean, and really? If you do these things, you are bound to be less effective as a speaker.

To misuse our language is much more than a matter of mere words. Contrary to popular belief, language does not mirror reality. It does not simply describe the world as it is. Instead, language helps create our sense of reality by giving meaning to events. Language is not neutral. The words we use to label events determine to a great extent how we respond to them.

As a speaker, you must decide how best to communicate to listeners. To do this, you need to be especially conscious of what language can do. Unless you use language accurately and clearly, not everyone will understand your ideas.

As you select the wording for your speeches, keep these questions in mind: How do I want my audience to react? What do I want them to think or feel? Which words can best evoke these responses?

Good speakers are aware of the meanings of words -- both their obvious and their subtle meanings. They also know how to use language accurately, clearly, vividly, and appropriately.

MEANINGS OF WORDS

- Denotative - precise, literal, and objective meaning with no emotional overtones, sentimentality, or moral judgments.
- Connotative - figurative and subjective meaning with emotional power that can arouse feelings of anger, pity, love, fear, friendship, nostalgia, greed, guilt, and the like.

USING LANGUAGE ACCURATELY

USING LANGUAGE CLEARLY

- Familiar Words
- Concrete Words
- Clutter

USING LANGUAGE VIVIDLY

- Imagery
- Rhythm

USING LANGUAGE APPROPRIATELY

Occasion

Audience

Topic

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Essay #5. "Using Writing in the Classroom," by Teresa Roberts.

My hardest course as an instructor is the class Indian Hills Community College calls Field Projects. In this class, the students are divided into groups of four or five to design and develop a computerized system of their choice. The group works together for six months during this process of selecting a system, designing it, and then actually writing the computer programs to implement it.

At the end of a three month period, each group submits a documentation folder on their system and gives a formal presentation in front of four staff members. The staff members criticize the group on the presentation and/or the actual system design - depending on the evaluator's area of expertise.

The students learn a great deal in regard to systems analysis and design. But, of equal importance is what they learn about human relations. Working with the same group of people every day for six months is quite a task for some of them!

Grading, for me, is extremely difficult in this course. It's hard to tell just how much each student is contributing to the project. One student may be a thinker and help with plans and ideas; while another student may be the one who says "just tell me what you want me to do." However, one cannot differentiate this by the documentation or the presentation; therefore, grading tends to be very subjective.

Since attending a Writing Institute, and with the help of my writing

group, I have come up with some ideas that I feel will give me a better insight into the group and into the individual members.

First of all, when a systems analyst is asked to design a system, he/she has to have management approval at several different stages before he/she can continue on to the next stage. Therefore, I felt one assignment might be that each group would submit a report to me, asking for approval of their project. This would be a rather informal writing with empnasis placed on grammar, spelling and selling point.

Another assignment I would like to try would be to have each student keep a journal. Each day they would write what they did on the project. In addition, I would also like them to write their personal ideas concerning their project or their group. This wouldn't necessarily be an everyday entry, just when they had something to share. Perhaps a particular problem or conflict within the group that occurred that day. Hopefully, this would make them more aware of themselves and their role in the group. It would also help me see what was going on with a particular student. If a student fell into one of my two categories, the journal might tell me why.

Finally, at the end of sixth quarter, I would like to have them write a 1 or 2 page report on the class or our computer programming course. They could write specifically: What I liked the most/least; what I would have done differently; what the course/class did for me personally; what I would like to see done in the course/class; - or they could write generally and cover several areas. This report would be graded on completion as well as spelling and punctuation. I feel students can have a lot of useful suggestions on improving a class, so this report would benefit the instructor as well as giving the student a chance to express himself/herself.

Our advisory board has always recommended better written communications for our students. This gives me yet another reason and purpose for imple-

menting some new writing assignments into my Field Projects class. I feel that just by giving these three writing assignments in my class, the student can benefit from a learning standpoint, and the instructor can benefit from a learning and grading standpoint.

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Essay #6. "The Journal for Painting," by Richard H. Dutton.

This paper is dedicated to the idea that learning is a wholistic experience. The use of a written journal for formulating creative ideas in student art classes is an intriguing idea and exemplifies the wholistic concept. Writing is the one common factor of communication that all students possess on entry to a studio art class, specifically, Painting I, II and III.

A major problem in teaching studio art classes has always been the many ideas and problems confronting the student. The use of journals that includes sketching to solve problems and organize ideas for the product would be helpful in achieving the class objectives as specified in the course syllabus. Writing and painting are both a creative and expressive experience that can be used together to advance the progress of the student.

Often, a student experiences ideas that flow like a rushing river, and the journal would be the place to jot down the flow of ideas in both written and sketch form. The whole idea is to formulate ideas and put them into a form to be used later for final creative expression. As journalist, the painter would be in intimate direct connection with his work through this process. The painting will reflect the feeling and habits of the artist.

The same idea occurs in writing where ideas are thought out and set down in verbal image. An excellent example of the use of writing and sketching for the creation of description are the manuscripts of Leonardo da Vinci and the various codices. In reality, they are notes of his thoughts about his

sketches or of the thing being described. In other words, knowledge itself being expressed. Writing and drawing, two methods of processing information, are the purposes of the journal in establishing a concrete beginning of idea development for painting.

So, the journal will be the verbal chatter and sketching notebook of the painting student -- the summary of class presentation and discussions. The following specification will be used in designing the journal:

JOURNAL FOR PAINTING

General Guidelines

The journal should follow a form of writings and sketches. The purpose is the development and formulation of creative thinking for painting.

Specific Instructions (What is to be included in the journal)

1. Two or more questions to the instructor for discussion and to arrive at conclusions. (per week)
2. Record thoughts and ideas concerning painting.
3. Compile sketches of ideas for future paintings.
4. Compile notes from research, i.e. books and magazine articles on painting.
5. Compile photographs of subject matter, technical information for the figurative painter.
6. Write a paragraph about each painting discussing at least one thought about the idea, technique, or what is good and bad about the work.
7. Specific topics should be included in the writings, but not be limited to:
   A. Composition
   B. Subjects
   C. Value and painting
   D. Color theory and philosophy
   E. Other artist ideas
   F. Specific styles and movements in art

Evaluation

The journal will be graded with the following criteria:

Content -- Does the journal show insight beyond the obvious? Are ideas logical and spontaneous and then specific ones developed beyond the basic idea?

Development/Effort -- Does the journal show effort and development of ideas as stated in the instructions?

Organization -- Do the items and content show development of thought and logical organization?

Ideas -- Is there a relationship between the journal and the students total development in painting?

If you need any help with your journal, see the instructor (Room 304A) or go to the writing lab (Room 208A).

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Essay #7. "Writing and Computer Aided Drafting," by Ron Deal.

One of the many new areas in technology education is Computer Aided Drafting (CAD). The general trend in CAD education seems to be to concentrate on the practical hands on use of a specific system, while much of the generic information which applies to CAD is left to be learned via the discovery method, on the job. While it certainly is important to have the hands on training, it is possible to teach many other things about CAD without infringing on that all too precious lab time. One important topic that the student can learn much about outside of lab time is what other CAD systems can do, that is, CAD systems other than those in the school's CAD lab.

A project that I have my CAD students do, in order to accomplish this goal, is to participate in a simulated industrial situation. The student is given a description of an engineering department within a company. This description includes such details as: 1) What sort of work will be done on the CAD system (drafting, design, finite element analysis, solid modeling, etc.). 2) How much time will be spent on the system by engineers, designers,

and drafters. 3) The salaries of these individuals. 4) How many systems are required. The student is given a limit as to the amount of money which would be alloted for the purchase of the system required for their situation, and is instructed to contact as many CAD vendors as they feel necessary in order to find a system which will satisfy the requirements of the situation and not exceed the amount of money alloted. The student is provided with a list of CAD vendors. They are also advised to read various trade journals and respond to the advertisements for CAD systems that they find there. If they cannot find a suitable system for the money alloted, they must convince me that I should give them more money to work with, in much the same way as would have to be done on the job.

The project culminates in a written report. In this report the student lists all the systems they seriously considered. They must briefly explain why they rejected those that were not selected. A detailed description must be given of the system that was selected along with a price breakdown and the calculations used in justifying the system. At this point I have considered having the students also give an oral presentation in a formal setting, in order to simulate the presentation which would be given to the president of the company and/or other upper management people.

This project provides several other opportunities for the student, aside from learning about different CAD systems. They are required to do a great deal of writing, which will serve to tune up and improve their writing skills. In addition to the business letter they will be required to write in requesting information, they will also be doing some informative and persuasive writing in the report.

Another benefit to be derived from this project is that it provides the student an opportunity to communicate with vendors. Many students will find it necessary to speak with various CAD vendors on the telephone. This not

only helps to improve their verbal communication skills but it puts them in touch with the real world as well.

I have had a great deal of success with this project. The students seem to enjoy it and it provides a learning experience which they might not get otherwise.

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Essay #8. "How Writing Can be Used in the Class 'UHF & Microwave'," by Larry Krier.

Writing is an everday occurrence for the communication technician. A clear and concise history has to be kept on all the equipment worked on. Other technicians may depend on the service history to help diagnose a future problem. Keeping records and writing reports might be required by government regulations. Reports for research have to be written in exacting detail, so there are no doubts in the reader's mind about the procedures or results. It is obvious that the technician needs to be a proficient writer.

The class, "UHF & Microwave," is a survey of high frequency and microwave communication equipment. Sixty percent of the time is spent in the lab, analyzing and trouble-shooting different equipment. The major writing assignment is the keeping of a lab journal. There is also a research project, which is done as an oral presentation. How to change the research project, to include a formal written report, is the main thrust of this paper.

Presently, there are no written guidelines for the research project. The research project is about a subject that the students are going to be tested on. A list of subjects, to choose from, is given to the students. They can work in pairs or by themselves. A written statement, indicating which subject they want to report on, is the students claim to that subject. The first one to claim a subject gets it. When the statement, indicating the subject preference, is turned in the student receives a presentation date.

The presentation date makes the presentation compliment the lecture. The oral presentation is the transfer of information from the researcher to the class, and includes a question and answer session.

A major concern is that requiring a formal written report, along with the oral report, may be an excessive work load for the students. The use of writing groups will help ease this problem to some extent. The group members can help each other with research, revising, and editing. Response keys and guidelines supplied by the instructor can improve the efficiency of the group.

One trouble, concerning the use of writing groups, is the time it takes from the technical lecture. This problem should be compensated for by the positive things that happen. Students in the writing groups will produce reports that are more concise and easier to understand. This should be reflected in the oral presentation. The lecture time needed to finish covering the subject should be reduced. Members of each group will also acquire some knowledge of the other subjects covered in their group.

The assignment can be in writing, making it clear what is expected of the student. A clear goal can be set up for the student to work toward. A specific format can be laid out for the report. The "MLA Handbook" (Modern Language Assn. 1980) and "The Gregg Reference Manual" (Gregg Div./McGraw-Hill Book Co. 1985) can be given as references to follow.

The subjects to be assigned need to be specific, but not so specific that it eliminates self-direction. If the subjects are not specific enough, two different students may cover the same topic. The subjects will be assigned randomly, but a chance to exchange with someone else will be given.

Guidelines can be laid out indicating what will be examined when the reports are being evaluated. Evaluation can also include a self evaluation, a group evaluation, and a class evaluation. These last three evaluation methods should be done with a response key. A response key will help establish

a uniform standard.

The following pages are the first draft of some papers needed to make the research assignment for the class titled "UHF & Microwave." Most of the information used comes from the "Writing Across the Curriculums" workshop. A few more pages need to be added to make it complete. The pages that follow are reworded or are almost direct quotes from the handouts. A lot of the development is already done for me by my fellow instructors.

FORMAT FOR THE FORMAL REPORT

TITLE PAGE

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

INTRODUCTION
  On a page by its self

MAIN DISCUSSION
  May use paragraph heads for major subdivisions
  Five to ten pages, double spaced lines

ENDNOTES

BIBLIOGRAPHY

GLOSSARY

REFERENCE APPENDIX
  Contains a copy of all articles that are not available locally

THE GREGG REFERENCE MANUAL and the MLA HANDBOOK FOR WRITERS OF RESEARCH PAPERS, THESES, AND DISSERTATIONS are available from the library. Their use should insure that you are using proper form.

EVALUATION GUIDELINES

CONTENT

A. Does the introduction give adequate information concerning the subject and the extent of the report? The reader should know what to expect when he reads on.

B. Does the main discussion have a logical flow?

C. Is the information clear and concise; not vague, general, or repetitious?

D. Are examples, analogies, tables, and figures used effectively?

E. Are quotations used and properly credited to their sources?

F. Is the subject of the paper covered in a technical way?

G. Is the report written in third person to avoid using personal pronouns?

H. Are the sentences complete, grammatically correct, and easy to read?

I. Does the summary effectively finish the paper?

MECHANICS

A. Is the spelling correct?

B. Are punctuation marks and capital letters used correctly?

C. Are the endnotes and bibliography properly constructed?

D. Are the margins adequate?

E. Is the paper typewritten and neat?

GROUP WRITING RESPONSES FOR REVISING

FILL OUT IN YOUR WRITING GROUPS AND GIVE TO THE READER AFTER THE DISCUSSION.

1. WHAT PHRASE OR PARAGRAPH DID YOU FIND TO BE MOST VIVID OR ENLIGHTENING?

2. TELL THE WRTIER WHAT YOU WERE THINKING AS YOU HEARD THE WRITING.

3. FIND ONE OR TWO AMBIGUOUS OR VAGUE WORDS. WHAT WORDS MIGHT REPLACE THESE?

4. WHAT PHRASE OR PARAGRAPH WAS THE HARDEST TO UNDERSTAND OR SOUNDED CONFUSING?

5. WHAT PART MIGHT BE GOOD TO EXPAND OR GIVE MORE DETAILS ABOUT? DISCUSS THIS WITH THE OTHER MEMBERS.

SELF EVALUATION

1. HOW MUCH TIME DID YOU SPEND ON THE PRE-WRITING ACTIVITIES?

2. HOW MUCH TIME DID YOU SPEND ON THE FIRST DRAFTS?

3. WHAT DID YOU TRY TO IMPROVE OR BETTER EMPHASIZE ON THE REVISED PAPER?

4. WHAT ARE THE ONE TO THREE STRENGTHS OF YOUR PAPER?

5. WHAT ARE THE ONE TO THREE WEAKNESSES OF YOUR PAPER?

6. PICK THE PARAGRAPH IN WHICH YOU DID YOUR BEST AT EXPLAINING A DIFFICULT IDEA OR TOPIC. PUT A CHECK-MARK BESIDE IT.

7. PLACE AN "X" BESIDE THE PARAGRAPH IN WHICH YOU HAD THE GREATEST DIFFICULTY GETTING AN IDEA ACROSS.

YOU ARE ASKED TO SUGGEST A GRADE FOR YOUR WRITING, BASED UPON THE WHOLE WRITING PROCESS (PRE-WRITING, WRITING, GROUP WORK, REVISING, AND FINAL DRAFT). BE HONEST. DO NOT INFLATE YOUR GRADE. I WILL ALSO EVALUATE YOUR PAPER. FROM THE TWO GRADES WE WILL HAVE A GOOD IDEA OF WHAT YOUR WRITING SHOULD RECEIVE. DO NOT EXPECT US TO SIMPLY AVERAGE YOUR GRADE.

WHAT GRADE WOULD YOU GIVE YOURSELF ON THIS WRITING? _____

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Essay #9. "Using Writing in a Computer Course," by Ray Ryon.

Writing, at first observation, appears to be almost nonexistent in most traditional computer courses. This might seem to be because writing can be used successfully in theory courses, but does not seem practical in application or "hands on courses" of which most computer courses are. I would like to give some actual examples of writing that are being used in computer classes by most instructors, and I would like to show some additional uses of writing that could be used in computer classes. Hopefully these examples will show writing can be used successfully in computer courses.

For an example I will use a computer course that is offered at Indian Hills Community College (IHCC) that is called Data Processing Concepts (D. P. Concepts). This course is similar to introductory computer courses as offered by most colleges. The course is required for computer majors as well as for many noncomputer related majors. This course is also taken by many nontraditional students who are interested in learning more about the computer. At IHCC this course is offered during the regular day schedule for either 1 hour for 4 days per week or 2 hours for 2 days per week. The class is offered during the evening schedule for 4 hours for 1 night per week. The course goes for 11 - 12 weeks.

D. P. Concepts is divided into two main parts. There is a general concepts portion of the class, and there is a "hands on" laboratory. The general concepts is concerned with terminology, history of the computer, hardware, software, programming, and society concerns. The laboratory gives the student time to work with a microcomputer. The student will create simple programs using BASIC. Also software packages, such as word processors, file managers, and spreadsheet programs, are used during the lab. All work is done on an introductory level but detailed enough for a student to continue on to explore by self instruction.

For educational purposes writing has been shown to be an effective teaching/learning tool. I do not wish to show the usefullness of writing in the classroom. There are several resources that are available that do explain the benefits of writing. An example is the book: Young and Fulwiller's Writing Across the Discipline; 1986; Boynton/Cook. Also many institutions (such as IHCC) conduct workshops that introduce instructors to the use of writing in the classroom.

The D. P. Concepts teacher, if asked, would probably say there isn't any or there is very little writing done in the D. P. Concepts class. In actuality there is probably much writing done. Often there are lectures given and the students will take notes. Note taking is one method of writing in the classroom. Another important feature of the D. P. Concepts class is the documentation of the program. Often there are questions from text books to answer and terms to define. These answers and definitions are often written out by the student. In all there are often each day activities that are writing activities in the D. P. Concepts class. However there are improvements that can be made using these existing writing activities.

Note taking is indeed a very important part of writing as a learning tool. Often the student will write notes that are unusable. The instructor can help improve the student's note writing. Let the student know before the lecture what the topic of the lecture is. Any reading assignment to correspond with the lecture should be made ahead of time so the student is familiar with the material. If the student is prepared the notes will be fewer and relevant, thus allowing the student to become part of the lecture and not part of the note taking. Another aid to help students with note taking is to prepare a general outline of the lecture. This could be part of the course syllabus. The student could then follow the outline and write in any details that are needed.

Program documentation is a very important concept for progamming classes. The documentation is provided as a method for the programmer to explain what the program does. Some documentation must be created in a way that will benefit someone who will use the program. This is called external documentation. External documentation would include instruction on how to start the program, how to proceed through the program, how to answer any question, how to enter commands to the program, how to exit the program, and how to handle any error conditions. Another form of documentation is internal documentation which describes how the program was written. This documentation would indicate what variable names are used, what the main procedures of the program are, what specific program instructions were doing and what the logic is of the program. Internal documentation can be somewhat technical in nature but external documentation needs to be completely nontechnical in nature. Many people who use the external documentation don't know how to code a program but do want the use of the program. Therefore it is important when creating the external documentation that the programmer will need to interpret technical vocabulary to common English. Indeed if a student does this successfully the documentation would indicate the student understands the program.

There are other methods of writing in the D. P. Concepts classes. Two categories I would like to expand upon are general topic papers and workaday writings.

General topic papers can be short papers or long papers on select topics in Data Processing. The common topics would be: How to use computers in your career? How are personal computers used? The effects of computers on society. Buying a computer. These and other topics can be used to generate an interest in certain topics that are often briefly discussed in class.

The general topic papers can add more meaning to the class if developed in writing groups. The writing groups are set up as approximately 5 students

per group. Each person of the group will choose a topic. The writing group will assist the writer through each of 5 steps in developing the paper. These steps are prewriting, drafting, composing, revising and editing.

In the prewriting step, the student will need to develop the topic of the paper. This can be done by using chaos writing. The chaos writing can be a timed process to write down any ideas when they occur. When the time is done the student can read the chaos writing to the group. The group can then decide on what is the center of gravity of the paper and this will give the writer a direction to follow.

During the drafting step the writer can put together the structure of the paper. The material about the chosen focus of the paper is brought together. This information is brought to the group and presented. The group can indicate if the writer is following the selected center of gravity.

When composing the paper the general structure of the paper is developed. An outline can be developed or the paper is written in a good structured form. The student should bring copies at this step for the group to look at while it is read out loud. The group can make comments and suggestions about the general structure.

The fourth step is of revising the paper. Any structure changes or reformulations should be done here. When done, the paper should again be copied and brought to the group for comments and suggestions. Often these comments will be for punctuation, spelling or sentence structure. The main papers structure should be intact at this point. The fifth step would be to edit the paper from the fourth step and create the final polished version. The group can look over the paper here for any surface concerns before it is submitted.

The writing group can be seen in this context as a means to help prepare the paper in the best form possible. However this isn't the only benefit.

When working on the five papers the students are presented material not always presented in class. This helps also to give the students a perspective from someone who isn't an authority figure such as the teacher.

The other form of writing that can be used effectively in the D. P. Concepts class is the workaday writings. This writing is of various forms. There are journals, summaries, short essays, and other forms. Even notetaking would be of this category. I consider workaday writings as those writings that are created in a daily context. A journal for instance can be written into, daily. Notes are taken daily. An essay could be written during part of a class.

The main use of workaday writings in the D. P. Concepts class would be to help clarify the experience of the class for that day. The journal could be a method for the student to write after the class those thoughts and ideas brought about during the class. The instructor could make the journal specific by suggesting certain topics to write about in the journal for that day. Also the instructor could leave the journal writing as general writing for the student, that is let the student write whatever develops.

Summaries are quite beneficial as workaday writings. At the end of a lecture or lab time the instructor could leave 5 minutes for the student to summarize the topics of the day. This helps the student develop the ideas before going somewhere else for the day. The summaries can also be used the next day to serve as an introduction for the next days lecture or lab. Another use of the summary is to have the students stop in the middle of the class and write a brief summary of an exercise that was just gone through. For example the instructor will describe how to proceed through a software package. The step by step instructions are followed by the student, however often the student doesn't understand what the steps are doing but will blindly follow the instructions. Writing the summary of the steps will help!

Indeed there are many ways that writing can be used and that writing is being used in computer classes like the D. P. Concepts class. It is important that students do know how to write. The D. P. Concepts class isn't where the students will learn about writing but they can use writing to help learn about computers. In fact the benefits aren't for just the student. The teacher benefits from the added tool that can be used to make the instruction diversified and more interesting.

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Essay #10. "Writing Institute," by Rassoul Dastmozd.

I believe that writing is a vital tool in order to establish better communication in any organization. Our graduates in the High Technology programs are placed in many areas of the high technology field such as research/development, testing, marketing, sales, procurement, manufacturing, maintenance, and quality control. These areas communicate with each other in writing. These writings are in the form of reports which are concise, full of detail and data, and in a logical sequence.

The purpose of this paper is to demonstrate how I use writing as a learning tool in the discipline I teach.

As an instructor, writing is one of the two ways in which I can get feedback from my students as well as determine how much knowledge and information they have retained.

I also use writing as a partial tool in evaluating my students in lab experiments and reports. These lab experiments/reports and their formats are similar to the reports that they write in real work situation, but in a smaller scale.

Each student in the class will gather all the information related to a particular experiment in a log book. From here the student will put all the

data under the proper format and will return it to his/her group.

The proper format is as follows:

1. OBJECTIVES: The first entry in your lab report should be a short statement which clearly states the goal of your experiment.
2. MATERIAL and EQUIPMENT LIST: List of all of the equipment and/or material used in performing the experiment. Make sure you list all major items such as Laser (make, model number, rated power), serial number, power meter (make and model), special optics, oscilloscope, etc.
3. PROCEDURE: You must include a step by step description of what you have performed. In addition, you must submit a drawing sketch and a picture of the experiment set-up. They should be clear and carefully labeled. You must include items such as references, procedures for aligning or mounting components. Any problems that you may encounter and their solutions must be submitted in the procedure's section.
4. DATA: You must use a data table properly labeled (include units). You may include drawings, graphs and photos that explain the data fully.
5. ANALYSIS: You will analyze the experiment and your results in this section. You must include possible errors and ways to eliminate them along with improved methods to do the experiment.

Upon the completion of this report, students will work in groups of three or four. Each team will review the individual reports of the team member. They will make suggestions on spelling, punctuation, grammar and usage, the format, the mechanics and logical sequence of each report. At this point each group member may change or revise his/her report before returning the final product to the instructor.

Finally, the instructor will grade each report according to the following

criteria:

A cover sheet should be the first sheet in each report. It must contain the course title and number, your name, the date and the name of your lab partner. All reports will by typed, they must be clear, concise, show a logical sequence and have a proper format. Each report will be graded according to the following guidelines:

Cover page ---- 2 points

Objective ---- 8 points

Equipment list ---- 5 points

Procedure ---- 15 points

Data ---- 25 points

Analysis ---- 40 points

General Appearance ---- 5 points

... about the author of this journal:

Rassoul Dastmozd is an instructor in the High Technology Department at the Indian Hills Community College, Ottumwa, Iowa. He teaches a variety of Electronic courses. In addition to these courses, he is presently teaching some courses in Laser Electro-Optic Program. He uses the format discussed in his journal for the fourth term L.E.O. students.

A sample of the report is enclosed.

Angle of Deviation of a Wedge

Image Orientation Viewed Through a Prism

(Components)

LAB NO: ------

L.E.O.

IHCC

10/22/86

NAME: _____

PARTNER'S NAME: _____

OBJECTIVE:

To calculate the deviation angle of a wedge and view prisms and the effect of light rays traveling through them.

EQUIPMENT:

HeNe Laser HN-5HFP s/n 2391

Sargent Welch Light Source model 85470110 s/n 544275

Rotational Table

Prism holder

Screen

Meter stick

Dove prism, Amici prism, Right Angle prism

PROCEDURES: Angle of Deviation

1. Set up the equipment as shown in fig. 1.on layout.
2. Follow steps outlined on page 23 Mod 7 in Components.
3. To calculate the apex angle, trace the wedge and use the trigometric function to find the apex angle.
4. Determine the angle of deviation using the formula $\tan \theta m = \frac{D}{L}$
5. Determine the index of refraction of the prism from the equation $n = \frac{\sin(\theta min = A)}{\sin \frac{A}{2}}$

Prism Lab

1. Follow procedures outlined on page 25 Mod 7 Components.
2. Sketch the results on the Data Sheet.
3. Explain the effects of each prism on the Data sheet.

ANALYSIS:

Prisms are used for changing all or part of the path of a beam of light. Prisms are very useful in optical devices or setups. They are used in many ways; for scanning, rotating, inverting, reflecting, splitting and Q-switching.

In the lab we calculated the minimum deviation angle of a Herschel Wedge. The minimum deviation angle is the smallest angle that the refracted beam deviates from the orignal beam path. Then by calculating the apex angle using trigonometry we determined the index of refraction of the prism to find the type of glass, of which the prism might be made of. We used the formula given in the book and found the index of refraction to be 1.51. To determine the type of glass we looked in Melles Griot Catalog and found the index of refraction of different materials. By looking at the chart at the wavelength of 632.8nM we matched the n=1.51 to Schott Glass BK7.

In the second lab we set-up we visually examined prisms and their effects on ray travel by observing through them to a source. The configurations of the prism play an important role in the outcome of the light rays. The Right angle prism reflects the light and rotates the image through 90°, causing a left-right reverse or up-down reverse depending on the orientation. The Dove prism interchanges the rays, causing a reversal in one axis and rotates as the prism is rotated. The Amici prism is a right angle prism with a roof which inverts both axis. The roof can be added to other prisms. All axis orientations are shown on the Data sheet.

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Essay #11. "Writing in High Technology Programs," by Michael B. Pollman.

One could never stress enough the importance of writing in high technology education. Through direct interfacing with industry, I find that communica-

tions skills are among the attributes most sought after by prospective employers. As an instructor, I find that writing is one of the most effective means of aiding the student to develope the logical, sequential thought processes required in high technology fields.

The writing done by technicians in these industries varies greatly with the type of industry and the stage of that industries development. In the newest industries, many technicians work in research and development laboratories. Much of their writing tasks involve the documentation of test results, often to military specifications. Even the more established industries must continually write and update operation and service manuals, due to the rapid advancement made in high technology. Many technicians advance into management positions and are required to write comprehensive reports and proposals.

In addition to training high technology students to do various types of writing, an instructor should endeavor to use writing as a learning tool. Due to the high content nature of technology programs, many instructors feel they cannot afford to evaluate student writings. The time required to evaluate these writings can be greatly reduced by supplying the student with a rubix describing the requirements of the writing, and rather than correcting all of the mechanics of the writing, point out to the student the general trends in the writing which do not fulfill the rubix. If time does not allow for extensive student writing, the reading and analysis of specialized technical writings should be used as an instructional tool.

The most common types of writing done by high technology students must be the traditional laboratory report. Due to the number of labs which must be completed, these reports are usually quite brief and follow a strict format. However, in the final months of a high technology program, it is often rewarding to have an entire class complete an unusually ambitious project as a group. Responsibility for specific tasks can be divided among

small groups, much as it is in industry. The documentation for each task could be completed by the individual groups, or a separate task group could be selected to do the documentation for the entire project.

Another type of writing found in high technology programs is the documentation of computer programs. The preliminary narrative writing of a problem analysis and design analysis help to organize the student's ideas into a logical sequence of thought. This aids the student in the next steps for the development of the computer program, flow charting, and coding.

A written description of a device's operation could also be incorporated into a high technology course. The description of a machine might be written using only the information found on a blueprint as source material. The operation of an electronic circuit could be written into a report which describes the function of each component in the circuit.

Technical writing and it's analysis should be utilized in high technology education whenever feasible. Industry has a need for technicians with both refined communication skills and logical thought processes which are developed through writing across the curriculum.

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Essay #12. "Workaday Writings in Mathematics," by Richard Mason.

As a result of a Writing Across the Curriculum workshop held on the Indian Hills campus during two weeks in May 1987, I chose to use and experiment with writing in one of my mathematics classes. The type of writing used was Workaday Writing (From: Teaching Writing in the Content Areas: College Level, by Stephen N. Tchudi) which can be generally characterized as personalized notetaking. The students record their feelings as they listen to the lecture, do problems during class time, or work on assignments at home. These thoughts are recorded as they occur and not as they are recalled later.

The course used for these workaday writings was College Algebra. The reason for choosing this course was two-fold. First, it is the first course a student may take for transfer credit at our institution and secondly, many students have difficulty with it mainly because of their mathematical backgrounds.

The first day of class I instructed the students that as they listen to class discussion and do their homework later, they were to react to the presentations, material, and problems critically and personally in writing. For a large class the respones may be kept in an extra notebook. For my summer class of seven students I decided to have them hand in their responses on a sheet of paper at the beginning of each class period.

The students were asked to react to such questions as:

1) What do you think of this material?
2) What do you like about this material?
3) What do you dislike about this material?
4) What did you already know?
5) What puzzles you?
6) What amazes you?
7) Other comments.

While the students were getting out their work and getting their questions ready at the beginning of each class period, I would read through their responses. Often times the responses would indicate where the present day's discussion would begin and any topic that needed more explanation. This was the main benefit to me. Each day I would ask the class if there are any questions over previously discussed material and many times were are no responses. I know there are questions, but no one will say anything. This can leave the instructor in a quandry. With responses already written down that problem is largely eliminated.

Another benefit for the instructor is that some material may be familiar to the students and so very little extra time needs to be spent on that topic. Maybe a brief review would be sufficient. This can save class time and prevent boredom for the students. As a side benefit the instructor will also get an evaluation of the textbook. Students will typically comment about how well the textbook explains concepts and how good the examples are.

The students gave the writing assignments a very positive evaluation. They never complained about this writing assignment. They did not perceive this as extra work. The writings were not graded nor was anyone criticized if he/she forgot to do it. Some comments were:

"The writing assignments helped because it made you think about the material and pay more attention to what you were doing."

"The best part of the writing assignments was to give the instructor a chance to see where each student was having difficultly and yet is afraid to speak up in class for fear of being thought of as stupid. Whenever I came to a problem, doing the writing helped me find out where my problem was, and it made me think. Eventually I began to understand".

"I liked this material because it gave me a feeling of accomplishment".

"This material isn't as hard as I thought it would be".

"I like it because it is interesting and fun".

"The story problems puzzle me, but after I sit down, take it slowly, and sometimes draw a picture it works better".

"I must slow down a bit to keep from making simple mistakes".

"It amazes me how some of the equations look hard but are really simple to figure out".

In closing I thought the writing assignments were successful. It gave me insights into the students' feelings and thoughts that I never had before. It is a type of writing that doesn't take a great deal of time for the student

or the instructor. I will undoubtedly use this type of writing in some of my future mathematics classes. As long as both the instructor and students benefit, it should be well worth the effort.

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Essay #13. "Integrating Writing Skills Throughout a High Technology Vocational Curriculum," by Lee C. Pulis.

Introduction

Few beginning students[1] in the High Technology vocational programs[2] at Indian Hills Community College (IHCC)[3] anticipate the increased emphasis in the curriculum on oral and written communication skills. Possibly new students express considerable anxiety on first-day surveys in Technical Communications class. Some worry about their spelling, or remember previous english classes, but many feel instant stress when informed of the on-the-job relevance, importance, and absolute necessity of oral communication, otherwise known as public speaking. They are not unique. Fear of speaking before a group ranked number one on the list of "The 14 Worst Human Fears" included in The Book of Lists[4]; death tied for sixth. Technical writing, evokes less tension than speaking, but still sounds like "english" to some first day students. By alternating written and oral assignments, technical writing in its many forms can be used to prepare for, and may even provide welcome relief from, oral reporting. Encouraging self-motivation through relevance to the students' goals is a key factor in effective vocational-technical

[1] Ages 18-45 years, work experience 0-30 years, entry qualifications: B or better grade in previous math courses, or similar indication of success

[2] Computer Maintenance, Robotics/Automation, Laser/Electro-Optics, and Telecommunications/Electronics

[3] Grandview and North Elm, Ottumwa, Iowa 52501

[4] Wallechinsky, David, Irving Wallace, and Amy Wallace; Wm. Morrow and Co., Inc.; NY, 1977

communication skills instruction.

Methods: Establishing Objectives

Motivating high technology students to accept communication skills and interpersonal problem-solving as critical complements to their technical skills is made easier by an active, hard working committee of industry advisors. At IHCC most advisors are employers who interview and select graduates to fill their own openings for entry level technicans. The IHCC High Technology Department has five such committees which meet twice annually in both large and small group sessions to review the first-year core and four specialized AAS degree programs. The minutes of meetings from all groups record clearly that customer relations is a very high priority concern in technical field service occupations. (For in-house bench repair the focus shifts to co-worker attitudes and interpersonal communication.) Individual advisors stress that communication skills, attitudes, values, and personality, as revealed in the personal interview, are very often the key criteria in employee selection.

Strong employer concerns, even dealing with the hard-to-address affective domain, are not treated as "hidden agenda" items. At IHCC instructors carry messages from advisory committee meetings into every classroom. On a quarterly basis during on-campus interview week the advisors voluntarily add impact to their motivational messages by stepping into a classroom in their roles as future employers.

Vocational instructors at IHCC typically come from technical industries and are able to reinforce student motivation toward communication skills by use of relevant examples from their own work experience. By incorporating writing and oral presentation skills into course objectives, as well as into teaching and evaluation methods, instructors point out to students the important expected outcomes of their course work. In a large department[5] it was

5 Nineteen instructors, 250 students, 76 distinct courses

deemed appropriate to identify objectives by staff concensus, to balance positive repetition versus excessive overlap through careful articulation, and to present the objectives in a standard format for the benefit of students and staff.

Curriculum concensus was reached through a three-round Delphi survey covering the three-term core courses and involving all staff and advisory committee members in optimum open expression of individual opinions. From this process emerged a list of eighty-five general objectives covering cognitive, affective, and psycho-motor competenies considered common prerequisites to all second-year, specialized high technology majors.

The general objectives identified were assigned to courses by a second concensus process, and course outline adjustments to accomodate changes in existing curriculum were assigned to individual instructors. The standard format adopted for course documentation was that of the Mid-America Vocational Curriculum Consortium (MAVCC) of Stillwater, Oklahoma. Inservice training of staff and full adaptation of the seventy-six courses into the specific competency-based format is proceeding. All courses are in some phase of development, with about eleven percent completed and available to students through the campus bookstore.

Results: Selected Course Content

Two of the completed courses particularly relevant to this paper are a first-term core course titled "Technical Communications" and a second-term course titled "Human Relations". Both courses focus on written and oral communication in technical context, problem-solving skills, and other transferable "Quality of Work Life"[6] skills (QWLSs). Methods of instruction are

[6]Skills for the Changing Workplace Series, Research and Development Series No. 253, National Center for Research in Vocational Educaton. The Ohio State University, 1987.

purposely a matter of instructor autonomy and style within the adapted MAVCC format, though "Suggested Activites" are provided in the instructor copies. Therefore, the results of the curriculum development effort reported here focus on general objectives and assignments from the two sample courses.

Table 1 summarizes general objectives, assignments, and transferable employment skills addressed in the first-term technical communications course. The occurrence of written assignments is highlighted in boldface. Table 2 presents similar data for the sequel course in human relations. A third course in sixth term, "Occupational Communications," is not yet fully documented, but includes assignments in resume writing, employment application, interviewing techniques, employer research, and customer relations principles. Resume preparation builds naturally on the self-awareness exercises initiated in second term and allowed to incubate while the student gains technical competency. Similarly, instruction in customer relations builds more specifically on behavior analysis, which is placed earlier, in the second term, for possible enhancement of student-staff interactions.

Observations

Allowing the student to see the purpose and larger scope of his expected achievements in the form of written objectives and stated QWLSs may of itself increase the impact and investment of student effort. Uncertainty and confusion of purpose are diminished, and self-motivation is more likely. Documented course materials and samples of student writings allow the visiting employer to quickly grasp the scope of training provided. Currently more employers address considerable attention in the personal interview to finding goal-oriented applicants conversant in effective customer relations principles, and displaying appropriate personal attitudes and institutional perceptions. Placement priorities argue against such important candidate selection criteria being left to the 'hidden agenda" of vocational education.

The skills listed in Tables 1 and 2 are significantly more than QWLSs; they are also a partial list of supervisory and management skills training topics. The entry level field service technician is often required to be on his own, making time management decisions and solving problems totally unrelated to his technical training. Those who are equipped with the skills addressed by the writing across curriculum (WAC) assignments listed in this paper should be in position to adapt and advance quickly, acquiring responsibilities to come back as interviewers themselves, to select their own team members. The time required for this cycling seems to be shortening, with six months to one year becoming more common. Shortening the cycle has effects greater than linear in terms of placement. For the graduates, preparedness for rapid advancement is more often measured in dollars. A particular reward for the educator is seeing the poise and confidence displayed by graduates that upon entering had expressed the normal fears of speaking before a group, yet upon return are perfectly comfortable briefing expectant graduates.

Future directions indicated include: 1) integrating additional writing assignments into the technical courses as a means of increasing comprehension and application of knowledge, 2) identifying the WAC assignments already in place, such as lecture notes, laboratory logs, research reports, logic flow diagrams, troubleshooting reports, etc., and focusing on their full value as learning tools rather than end products, 3) providing instructor in-service on holistic evaluation methods and on criteria for writing competency-based objectives, 4) identifying additional QWLSs not currently addressed, and 5) orienting instructors to promote student self-motivation and adaptation to change.

Table 1: Writing Skills Integration in Technical Communications
A Course in the High Technology Department
Indian Hills Community College

CATALOG DESCRIPTION: Practical experience in written and oral presentation of technical information is provided through assignments involving procedural listing, operationl description, data analysis, and demonstration.

2 credit hours

GENERAL OBJECTIVES	ASSIGNMENTS	TRANSFERABLE WORK SKILLS
Write clear, concise sentences conforming to technical format	Rewrite wordy sentences	Achieving technical style: clarity and brevity
	Correct faulty sentences	Review of English grammar and mechanics
	Use editing to correct	Tactful suggestion for co-worker writing improvement
Write organized paragraphs	Group paragraph writing	Leadership structuring Group cooperation
Present graphics correlated with text	Assembly procedure report	Following directions Word choice precision
	Lab report - Ohm's Law	Describing quantitatively Duplicate process reporting Forming original conclusions Comparing data
	Mech. Oper'n Descrip	Defining terms Describing function Estimating and approximation
	Tech Proposal with Transmittal letter	Persuasive writing Anticipating issues
Speak to accomplish goals:	Construtive problem speech	Positive, constructive probl. presentation
Inform		
Demonstrate	Technical demonstration	Use of visual aids Planning for effectiveness Reshaping information
Persuade	Impromptu persuasive speech	Decision making Thinking under pressure

GENERAL OBJECTIVES	ASSIGNMENTS	TRANSFERABLE WORK SKILLS
	MAYCC error checking	Tactful disclosure
	Oral tech updates	Research habits
		Self-updating

Note: Written assignments are indicated by Boldface type

Table 2: Writing Skills Integration in Human Relations
A Course in the High Technology Department
Indian Hills Community College

CATALOG DESCRIPTION: The student is guided in attaining greater awareness of attitudes, values and behaviors of self, others, and institutions. Self-defeating behaviors are discussed in the context of personal goal setting and attainment. Participation in classroom interaction situations allows application and analysis of principles and strategies. 2 credit hours

GENERAL OBJECTIVES	ASSIGNMENTS	TRANSFERABLE WORK SKILLS
Report on outside readings	Weekly outside readings	Self-discovery teaching
Demonstrate effective listening skills	Group feedback, clarification questioning exercise	Group process skills Structuring discussions Listening skills
Document awareness of attitudes, feelings, behaviors	Personal awareness profile	Finding patterns Pre-resume planning Pre-goal-setting planning
Discuss awareness of attitudes and perceptions	Self-caricature	Disclosure, openness Specific description
Understand basic principles of behavior analysis	Behavior analysis theory interpretations	Problem representation Comparison to models Specifying differences Classifying
Apply specific goal-setting methods	Goal-setting documentation	Time management Sequencing and scheduling Establishing measurable action steps
Identify non-verbal messages	Role playing	Empathy
Outline situations and strategies for dealing effectively with them	Simulated workplace situation analysis	Generating alternatives Finding patterns Generalizing
Recognize and suggest strategies for dealing with self-defeating behaviors		Synthesis, analysis, creating Interpersonal problem-solving

Note: written assignments are indicated by Boldface type

Essay #14. "Use of Student Notebook in Biology," by Ted Harbour.

A useful form of writing in general biology is a student notebook containing classroom discussions and lectures. There should be very little concern about correct sentence structure and punctuation, but legibility, neatness, clarity, and content would be important. In some instances correct spelling is essential. The parameters for the keeping of the notebook must be made clear to the student. The notebooks would be collected and checked by the instructor three times during the quarter. They may constitute a tenth of the student's grade.

At the end of the second week of the quarter, place students in groups of four or five. Explain that the purpose of the group is to share the areas of importance that they have listed in their notebooks with each other. Allow five to ten minutes for them to do this. At the end of their discussion, have each group report to the class. Following each group's report, the instructor has an opportunity to correct, to summarize or add to, and praise their comments. The student groups should meet outside of class each two week period thereafter. They should report to the class the following lecture period.

The notebook may be used as a resource for short quizzes of three to five questions at the beginning or end of a class. The students may be allowed to use the notebooks as their only aid to the questions. The value of this practice is that it encourages student attention in class and careful note taking. The discussion group reports would indicate the students grasp of the class material. Also, the group would help reduce apprehension and/or embarrassment in participating in classroom discussions. In addition, the group affords an opportunity for students to exchange information. They may discover the value in helping each other in this activity.